

'A taste for botanic science': Ferdinand Mueller's female collectors and the history of Australian botany

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Abstract

In 1884, Ferdinand Mueller, Government Botanist of Victoria, told his collector Mary Bate that she was 'one of the very few' women in Australia interested in botany in contrast to the situation in Europe and North America. This proposition is assessed using Maroske and Vaughan's biographical register (2014), which identifies 225 of Mueller's female collectors, and outlines their contribution to Australian botany. An analysis of this register reveals that Mueller achieved a scale and level of engagement between Australian women and botany far in excess of the benchmark he described to Mary Bate. This is an achievement that has not been acknowledged in the history of Australian botany.

Key words: plant collecting, colonial science, gender history

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Introduction

In 1884, Ferdinand Mueller, Government Botanist of Victoria, told his New South Wales based collector, Mary Bate, 'You are one of the very few Ladies in all Australia, who have any taste for botanic science, in contrast to what is observed in all Europe and North America' (L84.07.20). Mueller made this remark during a period in the Western world when the study of natural history had opened up to the general population, and the study of botany, in particular, was possible for girls and women (Watts 2007). Nevertheless, in opining the relative lack of enthusiasm Australian women had for his favourite science, Mueller was also playing an active part in overcoming it. His letter to Bate was in fact a persuasive, intended to encourage this young woman to remain engaged in what could be an uncomfortable pastime in the bush around Tilba Tilba, by allying her with her more demure flower-pressing and painting sisters at 'Home' in the United Kingdom.

Although he was Government Botanist of Victoria, Mueller's ambition had long been to write a flora of Australia, and to achieve this goal he needed all possible help in collecting specimens. If this meant pushing the boundaries of what was deemed normative behaviour for women in 19th-century Australia, then so be it. The bargain he was proposing seemed clear. In return for specimens of all named and novel species to be found in Australia, Mueller would help all-comers to develop a 'taste' for botany.

As Mueller was the central focus of the resulting collecting network, his power in shaping its processes should not be underestimated, but the relationships he developed with its members did not remain entirely within his purview. The collectors responded individually to their environments and to the directions of their tutor, developing their own appetites and talents for botany. At end of 43 years of service as Government Botanist, Mueller's collectors had helped him to accumulate a significant Australian herbarium in Melbourne, and to assist in the production of a flora of Australia, the first achievement of which he was unreservedly proud. The network of collectors itself, however, can also be regarded as one of his greatest achievements. Mueller did not distinguish the female members as a group, but the welcome he extended to them set him apart from his



male botanical peers. In so doing, he also helped to create a rich, diverse, and what has been a historically under-appreciated, heritage for women's engagement in botany in Australia.

Background

The period known as the Enlightenment is now recognised as the beginning of a golden era for women in botany in the Western world. A cultural tradition that linked femininity with nature, and a new interest in reason and rights, combined to 'smooth the path' for women's entry into botanical work of many kinds (Shteir 1996: 3). Girls and women continued to participate in botany into the 19th century but, as the discipline became more professional, they were relegated to the ranks of the amateurs and hobbyists (Shteir 1996: 5). General histories of science have tended to accept this gender division and celebrated the achievements of 'the great men' of science even when 'great women' were involved (Kass-Simon & Farnes 1990: ix).

Under the influence of feminism in the 1970s, historians began to recover the contributions of women to botany, and to investigate the discrimination that they have faced when trying to participate in science, and in obtaining due recognition. Shteir (1996) focusses on women and botany in England, Rudolph (1982) and Slack (1987) take on the United States of America, and most recently Olsen (2013) looked at botanical artists in Australia.

This study has been able to utilise a biographical register of 225 of Mueller's female botanical collectors compiled by Maroske and Vaughan (2014) that recovers the early history of women in Australian botany. The register brings into focus individuals who it has only recently been possible to identify in historical records, and who, compared to most women discussed in the history of Australian botany, are relatively unexceptional and fleeting participants in botanical activities.

Moreover, by comparing Mueller's female collectors with his male collectors, and with other collecting and botanical networks, this study has also been able to introduce quantitative analysis into a discussion in which it has mostly been lacking. All biographical information given in this article about female collectors is from Maroske and Vaughan (2014) unless otherwise specified.

Plant collectors

The reason that Mueller needed to establish a network of plant collectors in the first place was because he wanted to write a flora of Australia. He had probably nurtured this ambition from the time he arrived in the colony of South Australia in 1847, and boldly confessed it in his first letter to William Hooker, the Director of the Kew Botanic Garden, in 1853. 'I can assure you,' Mueller told Hooker, 'that neither egoism nor overestimation of my own powers, but only my ardent desire to promote our favourite science, is the impulse to a task, so laborious, so triing [*sic*] and so perilous' (L53.02.03).

To produce a flora, Mueller needed specimens of all the plants that grew in Australia. These would enable him to compile a complete list of the already described Australian species, and to give names to any species that had not yet been formally described. In his first decade in Australia, Mueller collected many of the necessary specimens, and in the 1860s liked to refer to himself as one of the world's most well-travelled botanists (e.g. L60.04.20). Nevertheless, Australia is such a vast country that it simply was not possible for him to collect all the specimens that he needed. To make up the shortfall, like other botanists who wrote floras, he recruited a network of collectors. As he put it in the *Perth Gazette* in 1869: 'Without such collateral local aid my works on the plants of the continent can never be completed' (19 February 1869: 2).

The typical 19th-century plant collector was a European man, but Mueller also sought out women, children, and Aboriginal Australians to undertake this work. There is no evidence that Mueller privileged women in his search for collectors, but he did exploit society's acceptance of women's interest in botany to make his network of collectors as large as possible. Moreover, in pushing the boundaries of what was possible for women and girls, he achieved some significant firsts among his female collectors for his collecting network as a whole.

Children

Of Mueller's 225 female plant collectors, 10 per cent can be defined as children in that they were 17 years or under when they collected their first known specimen for Mueller. Five were under ten years of age (Table 1).

Table 1. The age of Mueller's female collectors at the time of their first collection

Age at first collection	Number active (of 225)	% active
0–10	6	3
11–20	26	12
21–30	38	17
31–40	24	11
41–50	21	9
51–60	10	4
61–70	8	4
71–80	2	1
unknown	90	40

The youngest was probably Kathleen Ryan who was six years of age when she collected her first specimen for Mueller. Kathleen was the daughter of post and telegraph master Michael Ryan and his wife, Clara, who lived in Western Australia.

From Mueller's point of view, children were suitable plant collectors because they had sufficient ability to make useable collections, they could be induced to spend time in collecting with small rewards, and parents could be persuaded to encourage children to collect with a view to improving their education. Mueller was also prepared to entertain the possibility that children had some natural advantages over other collectors. As he told Kathleen Ryan's mother, Clara, in 1896: 'The young eyes of your children would soon discover the various minute land-plants near you, if once their attention was directed to them' (L96.02.02). Given that Mueller was seventy years old when he wrote this letter, with his own failing eye-sight requiring him to form ever larger handwriting, it was a point that he could appreciate.

The child-collector's point of view is more elusive. A letter from 13-year-old May Wise of Sale, Victoria, is a rare example of the voice of one of Mueller's girl collectors. 'We had a holiday from school and spent it down the Port Albert Road collecting plants,' Wise wrote to Mueller in 1895 (L95.10.01). Wise was fascinated by the orchids of her district and, with Mueller's encouragement, communicated a list of them, compiled with her sister, Lilian, and friend, Muriel Bennett, to the Field Naturalists' Club of Victoria in 1895 (*Victorian Naturalist* May 1895: 13).

Many of Mueller's girl collectors, especially the younger ones, were joined in specimen hunting by their mothers. These mothers were usually teachers at home, and saw the surrounding bushland as a large open classroom. This was certainly the case with Annie McCann, who raised nine children, including daughter and fellow Mueller collector Mona McCann, at Snowy Creek in north-eastern Victoria. Mueller sent Annie a copy of his educational text *Botanic Teachings* (1879) for her children. 'Words are but weak vehicles to convey all the thanks I would fain offer to you for your valuable work', she replied in poetical style. 'Believe me it shall long be a prized *souvenir* as well as a warm incentive in promoting that study of which I am such an ardent worshipper' (L82.03.00).

Aboriginal Australians

It is clear from a number of newspaper articles and letters that Mueller targetted Aboriginal Australians as collectors, but only as the assistants of Europeans (e.g. *West Australian* (1883) 24 July: 2; L95.08.29 to Clara Ryan). In the *West Australian* he urged 'inland and northern and far eastern settlers to induce the natives to bring, in baskets, specimens of all sorts of plants, to be dried at the stations and forwarded to me by post'. By this method, Mueller hoped that he could obtain specimens beyond the settled districts. 'The small expenditure required for barter articles I would gladly refund', Mueller added, and 'every finder will get in my works credit for his respective discoveries'. In this context, 'finder' presumably meant 'settler' rather than 'Aborigine'.

Clarke (2008: 108–114) identifies a number of male Aborigines as 'guides' who assisted male Mueller collectors, but George (2009: 264) states that no Aboriginal collector of either sex 'appears to be recorded on herbarium sheets'. Maroske and Vaughan (2014), however, have identified two European female collectors whose specimens probably included material collected by Aborigines, and three Aboriginal collectors (two of whom are female) whose specimens are at the Melbourne Herbarium.

Diana Bunbury of Picton in Western Australia was probably referring to an Aboriginal collector when she wrote the following to Mueller in 1880:

I spake to a little girl wha brings me Bush flowers for pressing, and faund that she had marked same archis roots, which I naw have much pleasure in sending. (L80.02.24)

The artist and author Ellis Rowan wrote openly about employing Aborigines to collect fresh plants for her to paint. On a trip to Jervis Island in the western Torres Strait in 1891, Rowan was able to get village children to collect flowers for her (Clarke, 2008: 112). These flowers may be among the specimens that are attributed to Rowan from Jervis Island at the Melbourne Herbarium.

The two female Aboriginal collectors who have been identified as Mueller's collectors were both assistants to a professional natural history collector in Western Australia, William Webb. Mueller, who was a regular customer of Webb, knew that Webb's 'plants are always purchased and are rarely his own collections' (L86.02.15). Nevertheless, there are 1538 specimens attributed to Webb at the Melbourne Herbarium (RBG Melbourne 2013).

A handful of specimens survive, however, that are attributed to Webb's wife, Lucy, a part-Aboriginal woman. A single specimen survives from Lucy's friend, Lucy Eades, also a part-Aboriginal woman, who collected the specimen with the Webbs' part-Aboriginal son, Thomas Webb. In an accompanying note, William Webb explains that Lucy Eades and his son had stumbled on a rare plant while collecting *Eucalyptus* seed for him, and that a specimen was now being forwarded, in bits, to Mueller, 'but you may reast [*sic*] assured that the Leaves belong to seed branches herewith' (L86.00.00).

Recruitment of female collectors

As has already been mentioned, Mueller tried to recruit as many collectors as he could, and did not privilege women in the process. Nevertheless, there is some evidence to suggest that women responded differently from men to the methods that Mueller employed to sign collectors up to his network.

Advertisements

The most wide-reaching method Mueller used to find collectors was to place 'advertisements' in newspapers. These took form of published letters, but also a purpose-written circular dated April 1876 (Mueller 1876). The circular outlined in detail how to make a dried plant specimen, what the specimen could be used for, and what a plant collector could expect from Mueller in return for his or her labours. Mueller did not attribute any specific identity to his putative collector in the

circular, preferring to use vague phrases such as 'those who may feel interested in the promotion of such'.

With the help of 'Australian Newspapers in Trove', a major online resource, it is possible to see that Mueller was successful in placing his circular in newspapers around Australia. It has been detected in nine newspapers, in four states (Table 2), and presumably this total will increase as more newspapers are digitised. From Mueller's point of view, publishing in regional newspapers such as the *Rockhampton Bulletin* in Queensland and the *Riverine Herald* in Echuca in Victoria, was especially important, because they were read in the districts most likely to yield new species or new geographical information about known species.

Despite Mueller's determined appeal to newspaper readers, only three of his female collectors definitely joined his network via this method.¹ This suggests that girls and women did not respond well to public recruitment drives, although it is difficult to draw a meaningful conclusion on the basis of the available evidence, because it is not known how most girls and women were recruited into Mueller's network.

One advertisement that yielded a positive response was published in the *West Australian* on 24 July 1883. With more emotion than usual, Mueller declared to his readers:

Perhaps I may not live many years to carry on my investigations, and I should like so much to give the finishing stroke for the elaboration of the rich and varied flora of Western Australia before I pass away.

Mueller's call for collectors was non-specific, but the newspaper added its own details and, Sarah Brooks, a 33-year-old settler in remote Israelite Bay, could have been forgiven for thinking that it had her in mind:

There are already many ladies living in these far distant parts of the colony, bereft, to a great extent, of those intellectual resources to which many of them have been accustomed. And upon these ladies, in particular, we would impress the interest they might derive from assisting our great Australian botanist in his valuable scientific researches. Much has been done in this way by the ladies in the settled districts and a still larger field for similar work is opened for those who have followed husbands and brothers into the remote and less known portions of this vast territory. (West Australian (1883) 24 July: 2)

1. Sarah Brooks, Mary Ann Cronin and Annie Eliza Ryland.

Mueller's advertisement was timed to coincide with the start of spring flowering, and Brooks was able to begin collecting immediately. On 5 November, she had enough specimens prepared to send a batch to Mueller. Her letter was brief, and oddly stilted because it was written in the third person:

Miss Brooks presents her compliments to Baron von Mueller and begs to state that in consequence of a porograph in the West Australion newspaper she has dried and now forwords some plonts she hopes may prove useful. (L83.11.05)

Relational ties

A more common means of recruitment for women seems to have been through a relative or a friend, who in turn may have responded to an advertisement, or some other means of recruitment. Of the 225 females in Mueller's network of collectors, 97 (43 per cent) also had a friend or relative who collected specimens for Mueller. The most common are mother–daughter and husband–wife pairs, but there are also multi-relational networks (sisters, cousins, sisters-in-law) and multi-generational networks (aunts, nieces, grandmothers).

The Foot and Biddulph families of central Queensland are illustrative of the importance of relational ties in recruitment to Mueller's network. There were at least six members of these families involved in collecting for Mueller, five of whom were female, and all of them, except Harriette Biddulph, collected for one or two years around 1890 at one or more of the family stations; 'Springsure', 'Cungelella' and 'Mount Playfair'. Harriette

was the oldest of the female collectors, but due to the complicated nature of the Foot/Biddulph relationships, and the large size of their families, Harriette's sister, Ellen, was also her daughter-in-law. There was a sixteen-year gap between Harriette and Ellen, and the sisters married a father and son. In 1893, Harriette wrote to Mueller, 'The young people unite with me in kind regards', by which she may have meant her sister Ellen, as well as her own daughters, who also collected for Mueller (L93.10.26).

By personal invitation

There are glimpses of Mueller's ability to persuade in his writing, but according to memoirs of individuals who met him, this was as nothing compared to his intensity in person (e.g. Lucas 1937; Gilbert 1992). Given the vast distances between Mueller and most of his collectors, however, personal recruitment could never rank high in his list of successful methods. This was especially the case for women who had relatively less opportunity to travel than did men in the 19th century.

An extraordinary exception to this generalisation was Marianne North, an English botanical artist and diarist, who included Australia in her world travels. In 1892, she published extracts of her journal, which included an account of how she came to collect for Mueller. North visited Western Australia at the end of 1880, and met up with him in Melbourne at the beginning of the following year. On viewing examples of her recent paintings, he became especially interested in a depiction of *Eucalyptus macrocarpa*, which he had seen for himself in Western Australia, but not in flower.

Table 2. Newspaper republications of Mueller's circular inviting 'those who may feel interested' to become his plant collectors (Mueller 1876)

Newspaper	Location	Publication date	Page
Argus	Melbourne, Vic.	1876, 28 April	6
Rockhampton Bulletin	Rockhampton, Qld	1876, 29 June	2
The Copricornion	Rockhampton, Qld	1876, 1 July	426
Northern Stor	Lismore, NSW	1876, 19 August	3
Bendigo Advertiser	Bendigo, Vic.	1877, 18 June	2
Riverine Herold	Echuca, Vic.	1877, 19 June	2
Western Stor & Romo Advertiser	Roma, Qld	1879, 12 May	4
West Australion	Perth, WA	1880, 20 January	2
Northern Stor	Lismore, NSW	1880, 17 July	3

When I shawed him the bud with its white extinguisher cap tied over it, which I was saving for Kew, he said, 'Fair lady, you permit I take that?' and calmly packeted it! (Vellacott 1986: 88)

This snatched fruit became the basis for North's only specimens at the Melbourne Herbarium (Fig. 1). As Mueller was soon able to obtain at least a dozen other specimens of *E. macrocarpa*, it is possible that his impetuosity with North was motivated as much by a desire to have a memento of this famous visitor, as of a unique specimen (RBG Melbourne 2013).

Barely hours after his act of thievery, Mueller wrote to Joseph Hooker, the Director of Kew Gardens and Herbarium. This was the institution he had deprived of North's specimen, and his letter both alluded to, and attempted to justify, his behaviour:

This evening I saw Miss North after her voyage to West Australia, and bid her Adieu, as she will start for Tasmania in a few days. Her paintings of W.A. vegetation are grand. I particularly admired your fathers Euc. macracarpa; you probably have this brilliant [sic] species at Kew, as I sent seeds repeatedly. (L81.01.15)

Mueller's female collectors

Percentage of total network

As a simple total, the figure of 225 female collectors does not in itself indicate how successful Mueller was in engaging the interest of girls and women in botany, or how his network of collectors compared to others. The current best estimate of Mueller's total number of collectors is about 1394, which is based on the list of Australian collectors and illustrators in George (2009). Of these 1394 collectors, George recognises 169 as female, which is proportionately about 12 per cent of Mueller's total network.

Mueller's plant collecting network was unique within the Australian context, because there were no other Australian-based botanists who were actively seeking the materials to write a national flora. There were also few contemporary Australian-based taxonomists. Nevertheless, the career of Charles Moore, Government Botanist in New South Wales, 1848–1896, was roughly coterminous with that of Mueller in Victoria, 1853–1896. According to George (2009), the Sydney Herbarium (NSW) obtained specimens from about 574 collectors

1853–1896, of whom about 57 or (10 per cent) were women. At first sight, this figure suggests that Mueller was not much more successful than Moore in recruiting women as plant collectors, but a significant number of the NSW collectors also collected for the Melbourne Herbarium (MEL), and this creates confusion in the statistics. Almost half the NSW female collectors were also MEL collectors, and their specimens may well have been sent to NSW by Mueller (or his successors at MEL).

While Mueller would have been aware of the activities of his fellow government botanists in Australia, as he indicated to Mary Bate in 1884, he mainly looked overseas for points of comparison to his activities. The pre-eminent plant-collecting network in the British Empire was that of the Kew Botanic Garden, which for the period of Mueller's career, was tended, in turn, by William Hooker, Joseph Hóoker and William Thiselton-Dyer. In 1901, a list of the Kew Herbarium collectors to 1900 was published (Jackson 1901). For the period of Mueller's career, there are about 1543 collectors,² of whom 63 (4 per cent) are identified as female. This is a significantly lower percentage than the 12 per cent achieved by Mueller in his Australian network of collectors.

When George Bentham wrote the preface for his flora of Australia in 1863, he claimed that the 'chief foundation' of this work had been 'the vast herbarium of Sir William Hooker' (Bentham 1863: vii). Whether or not Kew had a larger and more important Australian herbarium than Mueller is arguable, but it certainly had a comparable one. Jackson (1901) lists about 94 collectors who were active in Australia during Mueller's career, of whom nine (10 per cent) were female, a much higher proportion than for Kew's collection as a whole. Six of the nine female collectors were also Mueller's collectors, so he was probably responsible for the relatively high proportion of girls and women among the Australian collectors. Mueller himself is listed as the donor of 8018 collections, gathered 1850–1897 [sic]. It is a reasonable total given what is known about Mueller's field work (Maroske 2005: 57–62), but it is also likely that it incorporates the efforts of other collectors, including girls and women.

2. This figure is approximate only because a number of collectors are listed by Jackson without collecting dates.

Level of activity over time

Mueller's collecting network was created primarily to service his goal of writing a flora of Australia. Initially this project had no time frame, but in 1858 it was unexpectedly (from Mueller's point of view) taken over by Kew-based botanist George Bentham. After some fraught negotiations, Mueller agreed to assist Bentham, and shipped thousands of specimens to Kew while

Bentham wrote and published *Flora australiensis* in seven volumes 1861–1878. Mueller was under pressure during this period to build up his collecting network to obtain specimens for the flora, and to maximise his own chances of publishing new species before Bentham (Maroske 2005: 95).

The final volume of the *Flora* was published in 1878, after which date it would seem that Mueller had less



Figure 1. MEL 1612940, *Eucalyptus macrocarpa* subsp. *elachantha* Brooker & Hopper, collected by Marianne North in 1881

need for collectors. It is clear from Table 3, however, that the number of Mueller's female collectors steadily increased across the life of his network. Rudolph found the same trend in the United States of America in regard to a group of nearly 2000 women that he identified as 'interested' in botany, with the greatest numbers occurring in the last decade of the 19th century. His explanation for this outcome was that it reflected population increases, better record keeping, and improved education for women (Rudolph 1982: 1348).

Although these factors may also be at play in Mueller's network, it is likely that the network kept expanding because of a change in his and Bentham's plans regarding *Flora australiensis*. Although Bentham had initially thought to publish a supplementary volume at the end of the regular series to cover new species named during the course of the publication, in a hiatus between the sixth and seventh volumes he decided to conclude the series with the seventh volume. In response, Mueller informed his ministerial chief that he would continue the flora himself and issue two supplemental volumes, and two cryptogamic volumes (for spore-bearing plants) (L76.07.29).

The network, therefore, was still needed beyond Bentham's *Flora*. Mueller continued to plan for the extra flora volumes after Bentham's final volume appeared, but always found other, more pressing, projects to work on (such as censuses of Australian genera and species), and never published the extra flora volumes (Mueller 1882; Mueller 1883; Maroske 2005: 98–104). All Mueller's taxonomic works, however, benefited from the specimens gathered by his expanding network of collectors.

Geographical range of activity

As individuals, Mueller's female collectors usually covered little territory; the maps of their collecting localities often consisting of a single dot. This reflects the limited access women had to transport in the 19th century. To venture any distance in the heat or the cold in rough country was an effort. In a letter dated 1889, Charlotte Holding wrote that she 'wishes to let the Baron von Mueller know that her daughter has walked long distances & spent much time in getting these *special* plants' (L89.07.00). Charlotte's daughter, Lucy, collected

plants for Mueller around the port town of Wentworth on the junction of the Darling and Murray Rivers. Kate Taylor, a collector in Albany, Western Australia, was better off because she did not have to walk, but still felt constrained to inform Mueller, 'I can *only* get those [wild flowers] that grow within a short riding distance from town' (L80.04.27).

It is only when the localities of Mueller's female collectors are combined, that their geographical value to his flora work is fully revealed (Fig. 2). Not only do they cover more than half the country, this was in a century when significant portions had yet to be explored and mapped, let alone settled.

Mueller's female collectors were able to send him specimens from all six of the 19th-century Australian colonies: New South Wales (which included the Australian Capital Territory), Queensland, South Australia (which included the Northern Territory), Tasmania, Victoria and Western Australia (Table 4).

The greatest number of female collectors (27 per cent) came from Western Australia. This was the largest colony, but in the 19th century it also had the smallest population. Mueller focussed his recruiting efforts on this colony, because he knew that its flora was both rich and diverse, and could not be easily or quickly sampled. As he wrote in the *West Australian* in 1889, 'I would despatch a special collector to these wide tracts of the country, of which the vegetation is almost entirely *unknown*, did my departmental or private means admit of it' (2 July: 3). With no government botanist of its own, Mueller found a colony receptive to his cause. The local press was very willing to publish his advertisements, and, in 1896, a Postmaster-General (R.A. Sholl) waived

Table 3. The number of Mueller's female collectors active in each decade of his life in Australia

Period	Number active	% active
–1847	1	0.5
1848–1860	3	1
1861–1870	23	10
1871–1880	38	17
1881–1890	117	52
1891–1896	87	39
n.d.	11	5



Figure 2. Map of combined collecting localities of Mueller's female collectors

the postage on any parcel directed to Mueller that was marked 'botanical specimens' (*West Australian* 4 August 1896: 5).

The smallest number of Mueller's female collectors (8 per cent) came from South Australia. Although it was the second largest colony in Australia in the 19th century, and had a substantial population, it probably ended up in this position because Mueller lived and actively collected in the southern parts of the colony 1847–1852. Mueller also collected specimens in what is now the Northern Territory on the North Australian Exploring Expedition 1855–1856 (Maroske 2005: 57–60).

The desert regions of the centre of the Australian continent remained uncollected by Mueller's women, as did the Kimberley and the Northern Territory (at least by named female collectors). These were regions that were only visited by explorers and prospectors, and in the 19th century these groups rarely, if ever, included women.

Personal profile

Whatever their station in life, most Australian girls in the 1800s expected to marry, have children, and for domesticity to take up a significant part of their day. To insert the collecting of specimens into this routine was something of an imposition. Mueller was able to exploit the cultural association of femininity and plants to recruit female collectors, but in his 1876 circular on collecting he was at pains to emphasise that he was not going to interrupt anyone's normal activities too much. 'The process of drying plants for permanent collections is', he assured his readers, 'I may say, simple and easy in the extreme' (Mueller 1876).

Thus, Mueller's female collectors were able to join his network in every decade from childhood to old age (Table 1). Girls were well represented because, as has already been mentioned, Mueller could persuade parents that collecting specimens was educational, but similar numbers of women started collecting for Mueller in their 20s, 30s and 40s.

Of Mueller's 225 female collectors, 133 (59 per cent) were single when they collected their first specimen. Twenty-nine later married, but of these only nine continued collecting after doing so. Most of the women who gave up collecting had children, which may have been their reason for leaving Mueller's network. Nevertheless, many women (44 per cent) managed to combine marriage (and often child-rearing) with at least some collecting. This contrasts with the situation in the United States of America where Rudolph found only 28 per cent of the women who were 'interested' in botany identified as married (1982: 1349).

Perhaps the most striking feature of Mueller's female collectors, is the fact that the overwhelming majority

Table 4. Female collectors active by colony (with details on area and population [Caldwell 1987; States and territories of Australia n.d.])

Colony	Number active	% active	Area (km ²)	Pop. 1881
Western Australia	59	26	2,529,875	29,708
Victoria	57	25	227,416	749,825
New South Wales (inc. ACT)	50	22	803,000	861,566
Queensland	31	14	1,730,648	213,525
Tasmania	20	9	68,401	115,705
South Australia (inc. NT)	17	8	2,332,611	279,865

(72 per cent) spent less than five years in his network (Table 5).

They were like Charlotte Taylor of 'Thomas River Station' in Western Australia, who collected specimens near Thomas River in a single year, 1887. The centre of Charlotte's life was definitely always elsewhere. She trained as an artist at the National Gallery of Victoria in Melbourne, but the early death of her father obliged her, and a sister Jessie, to become teachers. Around 1880, the sisters moved to Perth and established a boarding school 'for young ladies with delicate constitutions'. The school failed in 1882 and the following year Charlotte, aged 21, married Campbell Taylor, a pastoralist, aged 41. They did not have any children. The Taylors' properties were in a remote location on the south coast of Western Australia, where Charlotte made time to paint; her subjects including landscapes and the heads of Aborigines (*West Australian* 6 July 1886: 3). Charlotte was probably recruited into Mueller's network by her husband, or her sister-in-law, Kate Taylor, who already collected plants for Mueller. A season of gathering would have been enough to obtain specimens of the plants that grew around Charlotte's homestead, and Mueller would have provided her with names by return post. After her husband's death in 1900, due to a buggy accident, Charlotte taught art in Perth before travelling to Paris in 1906 to study at 'Julien's studio'. She died at Burwood Private Hospital in Melbourne in 1944 aged 84.

Twelve per cent of Mueller's female collectors spent between six and ten years in his network, and only a

handful of collectors spent more than 20 years. The longest participant was Mueller's sister, Clara Mueller (later Mrs Wehl) who collected for her brother for at least 46 years.

Professional profile

The most common female professions in the 19th century were 'daughter', 'wife', and 'mother'; all relational, and mostly dependent on the income of a man. This situation is reflected in Mueller's network where at least 141 (64 per cent) of Mueller's female collectors were in one of these positions at the time when they collected their first specimen (Table 6). When Mueller wrote to Mary Bate in 1884, he suggested that she compare herself to the 'Ladies' of North America and Europe who had 'a taste for botanic science'. While Bate, and Mueller's other female collectors, may have known about or even aspired to this ideal of leisured culture, their domestic reality was usually different, and very diverse.

Of the economically dependent women, 90 were in families that derived their income from the land, either as pastoralists, settlers, graziers or farmers. Mueller actively sought out rural-based collectors, because they were the most likely to obtain specimens of new species, or new species for a locality. At one end of the rural spectrum was Jane McKellar, whose father, Thomas McKellar, owned a succession of pastoral properties in Victoria, South Australia and Queensland. Jane collected specimens for Mueller at 'Raglan Station' in Queensland, in 1886, but this would only have been as a tourist; her parents by then having retired to a grand home in Toorak. When Thomas McKellar died in 1900, he left an estate worth £123,500, a vast sum at the time. Jane received a legacy of £1,000 and 2 ½ per cent on the income of the estate per year (*Brisbane Courier* 27 October 1900: 14).

At the other end of the rural spectrum was Martha Kentish, whose parents travelled across country from South Australia by bullock wagon to land that had been pre-selected at Bridgewater-on-Loddon in Victoria. In 1870, the property flooded, including the homestead, and Martha's mother and older sister lived on the roof of a shed for more than a week. After Martha was born, the family established a sheep farm called 'Pyramid View' near the village of Pyramid Hill. As in their first selection, daily life involved all the hardships of living in a bark

Table 5. The duration of activity of Mueller's female collectors

Duration of collecting activity (years)	Number active (of 225)	% active
0–5	163	72
6–10	26	12
11–15	10	4
16–20	6	3
21–25	2	1
26–30	0	0
31–35	0	0
36–40	1	0.5
41–45	0	0
46–49	1	0.5
unknown	11	5

hut, carting water, clearing land, heat and flies. In 1889, Martha's father was declared insolvent with debts of just over £117 – a very different financial situation to that of the McKellar family. Martha went to live with a brother, Walter, at Charlton, about 100 km to the west. She was recruited into Mueller's network by her cousin, Jessie Hussey, in South Australia, and collected specimens in 1895 at Wychitella, which was a few stops along the railway line from Charlton. Martha started over again when she married John Barrett Mann in 1905 and they established the farm 'Mountainquest' near Quambatook on new land in the Mallee.

About eight (4 per cent) of Mueller's women collectors were definitely supporting themselves financially when they joined his network (Table 6).³ Of these, only one had any claim to professional status as a botanist, Amalia Dietrich, a natural history collector for the Godeffroy Museum in Hamburg (Sumner 1993; Scheps 2005). Rudolph (1982) found similar low figures for professionals and botanists among women 'interested' in botany in 19th-century America, a reflection of discriminatory educational and employment practices.

By the late 19th century, however, there were signs of change, and women willing to take advantage of them. A decade after she began collecting for Mueller, Flora Campbell became the second, and only other, professional female botanist in his network. The daughter of the first harbour-master of the Port of Melbourne, Flora was raised and educated in Melbourne. An early member of the Field Naturalists Club of Victoria (which allowed female members), Flora developed an interest in cryptogams, and published articles on them in the Club journal. In 1888, she was hired by the Department of Agriculture to undertake research on the destructive hop-spider in Gippsland. She married the same year, aged forty, to a widower, William Martin, aged 54. They did not have any children.

In 1890, Flora went to Queensland and met that colony's Colonial Botanist, Frederick Manson Bailey. Her relationship with Bailey became a source of tension with Mueller who liked his collectors to communicate either with him alone, or through him to other botanists, so that he could keep track of developments in Australian botany, and keep control of them (Taylor 1996: 134).

3. Aldersey, Atkinson, Butler, Dietrich, Henderson, Manton, North, Louise Wehl.

Flora was the only woman to give a paper at the conference for the Australasian Association for the Advancement of Science held in Melbourne in 1890, which was probably a high point of her career.

About 1892, Flora and her husband established a grazing property, 'Weebar', at Drouin in Gippsland where Flora continued to undertake independent scientific research, to correspond with mycologists, to illustrate fungi, and to write letters to newspapers about fungal diseases. Her husband predeceased her, and

Table 6. Profession of female collector's father or husband at the time of her first collection

Profession	Number (of 225)	%
accountant	1	0.5
author	1	0.5
bank manager	1	0.5
builder	2	1
businessman	6	3
clergyman	3	1.5
coroner	1	0.5
forester	1	0.5
hotelier	2	1
journalist, newspaper owner	2	1
labourer	1	0.5
librarian	1	0.5
lighthouse keeper	3	1
magistrate	1	0.5
mariner	1	0.5
missionary	1	0.5
natural history collector	1	0.5
pharmacist	1	0.5
physician	6	3
policeman	2	1
public servant	2	1
settler (farmer, grazier, pastoralist)	90	40
soldier	2	1
solicitor	3	1.5
surveyor	3	1.5
teacher	2	1
telegraph master	2	1
self-supporting	8	4
unknown	73	33

she decided to leave her property to the Presbyterian Church, and her scientific equipment and collections to the MacFarland Library at Ormond College. While the money was undoubtedly appreciated, unfortunately the rest of the legacy can no longer be traced.

Contribution to Australian botany

Specimens

As Mueller indicated in his circular on collecting plants of 1876, what he most wanted from his collectors, male or female, was specimens, and in great numbers. This was not only because he needed examples of all the different kinds of plants that grew in Australia to write a flora, but also because, 'it is necessary to study still further the degrees of variability, to which all kinds of plants are more or less subject, with a final view of circumscribing the exact characteristics of each species' (Mueller 1876).

Mueller's female collectors did not disappoint, and the Melbourne Herbarium database credits many thousands of specimens to their efforts. The totals for individual collectors, however, are often barely indicative. Thirty (13 per cent) are represented by a single specimen, and thirteen (6 per cent) do not have any specimens listed in the Melbourne Herbarium database. The missing specimens can be partly explained by the fact that Mueller himself sent specimens to botanists overseas in exchange for extra-Australian specimens. Moreover, his successors as Government Botanist, (from Alfred Ewart up to Richard Pescott) took this program even further. In the absence of their own collecting networks, or any regular staff field work, they continually returned to the 19th-century specimens in the Australian collections to support their exchange programs with overseas institutions (Helen Cohn pers. comm. September 2013). Researchers who wish to find additional specimens of Mueller's female collectors, therefore, will need to look in herbaria in Europe, Great Britain and possibly North America.

New species

When Mueller received a parcel of specimens from a collector, his first task was to identify them. He went through the sheets naming the ones he knew well first, then the more difficult, until he could do no more.

These represented potential new species. Mueller knew in advance what plant groups Bentham intended to include in each volume of *Flora australiensis*, so there was time to publish new taxa before shipping specimens off to Kew. This meant Mueller could take the credit for new Australia taxa rather than Bentham. It was some compensation for losing the authorship of the *Flora* (Maroske 2005: 95), and also ensured the species would be described even if the specimens were lost on the still risky voyage to England (Lucas 2003).

Mueller named 42 new species, mainly phanerogams (or seed-bearing plants), on the basis of specimens sent to him by female collectors. This was not as many, relatively speaking, as for his male collectors, but male explorers were always going to be first to a region and to collect new plants, and female settlers could only hope to pick up what they had missed. Mueller himself collected the types of 300 species, and four of his male collectors were responsible for over 100 types each; John Dallachy, Walter Hill, George Maxwell, and Augustus Oldfield (Chapman 1991; Home et al. 1998 Appendix C).⁴

For plant groups Mueller was not actively working on, such as the fungi, algae, mosses and lichens, Mueller sent collectors' specimens to botanists overseas, and they named the new species. Cryptogams, in any case, were not included in *Flora australiensis*. Establishing the numbers of new taxa based on specimens collected by Mueller's female collectors in these groups (and presumably forwarded to overseas botanists by Mueller) is less straightforward than for phanerogams, because the types are often in overseas herbaria. Nevertheless, at least 128 of these cryptogams (and phanerogams) named in Mueller's life-time, are identified in Maroske and Vaughan (2014).

At times, Mueller contemplated developing an expertise in cryptogams, and went so far as to name several, including *Marasmius equi-crinus* F. Muell. ex Berk (Horse-Hair Mushroom), based on a type collected by Mary Hodgkinson. He realised, however, that he did not have the time or resources necessary, having already expended his energy and capital on mastering the taxonomy of higher plants. Nevertheless, he did not wish

4. NB M's type descriptions often cite multiple specimens and collectors.

to hand over the cryptogamic specimens of his female collectors to fellow botanists without some return. As he confided in a letter about a mutual correspondent and lichenologist in Munich:

According to Krempelhuber you might almost believe that Mrs Hodgkinson and the others sent [the specimens] to him themselves. The lot came from me, was collected on my initiative and sometimes also at my expense; and K. has not touched my name to a single species. (L81.01.12)

New species have also continued to be named on the basis of specimens collected by Mueller's female collectors long after his, and their, deaths (Maroske & Vaughan 2014).

Geographical limits of species

In his circular of 1876, Mueller indicated that as well as needing specimens to create a list of all the plants that occurred in Australia, they would also be used to 'trace out the exact geographic limits of the many thousand species which constitute' its 'original vegetation' (Mueller 1876). This was standard information in a 19th-century flora and served a number of purposes. From a reader's point of view it helped to know what species did and did not occur in an area when attempting identifications. From a botanist's point of view information on where species occurred was the raw data for the emerging discipline of botanical geography, which investigated questions about how climate, and changing climates, impacted the distribution of plants around the world (Maroske 2012).

As has already been noted, individually Mueller's female collectors did not make significant contributions to the definition of the geographical limits of species. Collectively their specimens, together with those of their male colleagues, were the basis of all the statements about the geographical distribution of Australian taxa in *Flora australiensis* and Mueller's own taxonomic publications.

Plant products

Once Mueller established a relationship with a collector that endured more than one or two seasons, he often began to call on him or her to contribute samples of plant products as well as of dried plant specimens.

Mary Bate, who collected for Mueller for at least six years, became one of his most reliable sources. In a letter of 1883, Mueller thanked her for some *Tragacanth* Gum and asked if she could obtain him some more for the forthcoming International Exhibition in Calcutta (L83.08.11). The catalogue of exhibits for the Victorian Court attributes a 'Collection of Gums, Resins, Kinos, from Australian Trees specifically named' to Mueller, which may well have included contributions from Bate (Calcutta International Exhibition 1883). In 1884, Mueller asked Bate to source a pound of *Eucalyptus* Kino for him. 'It is wanted', he explained, 'for comparative chemical experiments as regards adstringency [sic]' (L84.01.04). If the experiments went ahead, Mueller would have most likely incorporated the results in the final part of *Eucalyptographia: a descriptive atlas of the eucalypts of Australia and the adjoining islands* that was published in 1884, or in one of the later editions of *Select extra-tropical plants readily eligible for industrial culture or naturalisation* (1885, 1888, 1891, 1895), which was his main publication on economic botany. No specific reference to Bate, however, has been found in these works.

Mueller was genuinely interested in all aspects of botany, but privately he admitted that he could hardly afford not to be. As he told William Thiselton-Dyer in 1878: 'These young colonies do not care about my sorting Museum specimens; they want me to elaborate for them means for new industries & cultures' (L78.05.12). Thus, the contributions that Mueller's female collectors made to economic botany also helped to secure his position as Government Botanist of Victoria.

Aboriginal names

The members of Mueller's collecting network were obviously guided by his instructions when they gathered specimens to send to the Melbourne herbarium, but they also made unsolicited botanical contributions that were shaped by their own interests and responses to the environment.

George (2009: 264) lists several of Mueller's male collectors who recorded information about Aboriginal use of plants and Aboriginal names for plants, but this study reveals that Mueller's female collectors did so as well.⁵

The most extensive set of notes survives from Mary Kennedy, for whom over 550 specimens are lodged at the Melbourne Herbarium. Kennedy collected for Mueller between 1885 and 1887 while she was living at 'Wonnaminta Station', one of the western-most pastoral properties in New South Wales. The bulk of Kennedy's specimens were collected at or around Wilcannia on the Darling River, and the Aboriginal plant names and usages she recorded presumably came from Aborigines who she met while collecting there. For example, Kennedy's notes with a specimen of *Boerhavia dominii*, collected in Wilcannia in 1885, give the name 'Winkeroo' and the comment 'Root eaten by natives' (MEL 2218269).

With eleven children to care for in primitive conditions, it is remarkable that Kennedy found time or energy to be interested in the environment beyond her homestead. In a letter written in 1885, Mueller told Kennedy that the value of her specimens was 'much enhanced by the native names you so carefully ascertained'. Looking to the future he predicted that as part of the Melbourne herbarium, 'these collections can be preserved for centuries, so that your notes of the aboriginal names can be consulted with these plants, long after the Darling-tribes have passed away' (L85.12.12).

Mueller was wrong about the Aboriginal people, but their languages have significantly diminished. According to Paul (2012) there are only two people alive who can speak the Darling language (Paakantyi or Baagandji) fluently, which means that the kind of information collected by Mary Kennedy is an important cultural resource for Aboriginal communities of the Wilcannia region, as well as the discipline of ethnobotany.

Specialist knowledge

Most of Mueller's collectors focussed their attention on phanerogams, but in the 19th century sub-groups of plants, especially cryptogams, became popular subjects of collection and study. In the United Kingdom, 'Ladies', especially, became associated with Pteridomania, or a craze for ferns, but other aesthetically pleasing groups, especially among the cryptogams, were also taken up by them (Allen 1996). These botanical enthusiasms were reproduced among Mueller's female collectors in ferns (e.g. Amy Beal), orchids (e.g. May Wise), algae (e.g. Jessie

Hussey), fungi (e.g. Flora Campbell), lichens (e.g. Lily Berthon) and mosses (e.g. Annie Edwards).

Rudolph (1982: 1350) found relatively small percentages of women 'interested' in specialist plant groups in the United States of America in the 19th century. Ferns were the most popular at 13 per cent of his study population, but no cryptogamic plant group attracted anywhere near the same level of interest.

Mueller's female collectors, however, are well represented in specimens and new taxa in the cryptogams, groups he actively encouraged his collectors to obtain. In 1882, he sent a copy of a catalogue of Australian mosses by Ernst Hampe to Annie McCann (Mueller 1881). 'How very delightful it is to have a knowledge of so many of those beautiful, fragile things', she replied, 'strewn, as they are "by an unseen hand"'. McCann lived at Snowy Creek (later called Granite Flat), a hamlet about 10 km above the junction of the Snowy Creek and the Mitta Mitta River in north-eastern Victoria. Enclosed in her letter was 'a packet of those lovely inhabitants of our lonely glens' collected 'from the fertile banks of the Mitta Mitta', 'from Rockalpine' (the name of the McCann's house), and 'near the River Dart' (L82.09.10).

Botanical art

Perhaps the most obviously gendered contribution that Mueller's female collectors made to Australian botany was via the decorative arts. As the 19th century progressed, education became less discriminatory, but the middle and upper classes of colonial society still regarded 'ornamental accomplishments' as valuable for their daughters, including drawing, music, fancywork and recitation. Botany was firmly established as one of the most appropriate subjects of these female forms of creative expression (Jordan 2005: 13–17).

At least 20 (9 per cent) of Mueller's female collectors were botanical artists, several of whom are very well known and researched: Marianne North, Ellis Rowan, the Scott sisters, and Louisa Meredith (e.g. Olsen 2013). As Jordan (2005: 18) observes, in the context of Australia, botanical art 'had a particularly strong appeal for many women artists' because it gave them 'a real chance to contribute to scientific discovery' without 'running the risk of compromising their feminine virtue in the process'. The well-known botanical artists contributed a number

5. e.g. Bate, Alice Eaton, Hussey, Mary Kennedy.

of unsolicited original sketches and watercolours to Mueller's herbarium as attachments to specimens (e.g. Louisa Atkinson). Mueller was willing to identify plants in the artwork of these collectors (e.g. Ellis Rowan), and gratefully accepted copies of, and dedications in, published illustrated works (e.g. Charsley 1867).

A female botanical artist still awaiting rediscovery is Annie McCann, who, at the end of a long life in 1924, was eulogised for her watercolours, fancywork and poetry. Born, and given a thorough 'ornamental' education, in Ireland, McCann's artistic output in Australia was prodigious. 'She was looked upon', according to one obituary, 'as one of the most accomplished painters of flowers from nature.' Her collection of fancywork, which she called needle painting, was reputed to be 'the most extensive and valuable in the country, and she published the first book of poetry by a woman in Victoria (*Hobart Mercury* 17 June 1924: 6). Mueller cannot be given any credit for these achievements, but he did teach McCann the scientific names for plants, and the results can be seen in poems such as 'Anguillaria Australis', which is about the Early Nancy, one of the first sub-alpine plants to flower in spring (McCann 1888).

Mueller did not himself draw plants, even the barest of sketches, relying on notes made in the field and specimens when working up new species from his collections. He asked no more from his collectors, except in the case of what he called 'succulent fungi'. These fleshy forms were completely altered as dried specimens, often losing characters that were vital to their identification (May 1990: 267). Mueller did not restrict himself to either gender when recruiting fungi artist-collectors, but he made use of the fact that it was culturally acceptable for women to draw plants. In an article describing new species based on specimens and illustrations by Margaret Forrest in Western Australia, Mueller commented, 'I wish that ladies in other parts of Australia would devote their artistic talent likewise to such original and really useful purposes' (Kalchbrenner 1883: 638). Mueller's female fungi artist-collectors included Flora Campbell (later Mrs Martin), Madeline Lewellin, Ellis Rowan, Anna Walker and Marie Wehl.

Few of Mueller's own publications were illustrated, but the pictures concerned were all commissioned from male artists.⁶ There is no explanation in surviving documents why Mueller overlooked the skills of the

professional illustrators among his female collectors, such as Harriet and Helena Scott (Kerr 1992: 706–708), or help to train any of the amateur illustrators into a professional level of competence. It is an absence, however, that suggests Mueller did not think of his female collectors as having careers.

What did female collectors get in return?

A taste for botany

The reward that Mueller used to recruit collectors, male or female, was the promise of names for their specimens. As he put it in his circular on plant collecting:

Whoever wishes to become scientifically acquainted with the native plants of his vicinity or of localities otherwise accessible to him, can obtain the specific names, if a duplicate set is retained, in which the specimens are numbered correspondingly to those of the transmitted set. (Mueller 1876)

Even when *Flora australiensis* was completed in 1878, it was an expensive purchase and required expertise to use, so that having an expert personal identification service was an attractive offer. A private correspondence with an Australian so famous that his 'name may be said to be a household word' was also undoubtedly an added incentive (*West Australian* 7 August 1896: 12).

In 1882, Annie McCann wrote 'I considered myself indeed highly favoured by your esteemed correspondence and by being advised of the names of so many of our local plants' (L82.03.00). The sentiment was echoed by Jessie Hussey, a collector in South Australia:

I feel deeply sensible of the kindness, and honor you do me by devoting so much of your valuable time to me. It was very kind of you to check my list of names so promptly, and also to write out the names of plants I should yet find here – all this is greatly appreciated by me, and is for more than I expected. I do not know how to thank you for all your kindness to me. (L95.10.04)

Jessie Hussey kept Mueller's letters as treasured personal items and consequently most have survived, while only a handful of hers are known (as is the case

6. e.g. Richard Austen, Ludwig Becker, Robert Graf and Frederick Schoenfeld (pers. comm. Helen Cohn 2014).

with all Mueller's collectors), mostly found with her specimens.

Published acknowledgement

If a collector's specimens turned up any 'new or rare plants' Mueller promised that these records would be duly noted in his publications (L76.04.00), most often *Fragmenta phytographiae Australiae*, but also numerous other journals in which he published new taxa. Again Mueller made no gender distinction.

To Maria Henley, a collector near Wangaratta in Victoria, Mueller wrote in 1891, alerting her to a forthcoming notice about the annual native flower show of the FNCV in the *Victorian Naturalist*, 'when special mention will be made of the rare kinds also in your valuable sendings' (L91.11.20). 'Miss Henley' was duly mentioned as one of the principal exhibitors, along with 'Baron von Mueller' (Anon. 1891). What this acknowledgement meant to Maria Henley is not known, because her correspondence to Mueller does not survive, but she was a regular contributor to the FNCV wildflower shows for a number of years.

George Bentham also cited the records of Mueller's female collectors in *Flora australiensis* as authorities for locality information. Louisa Atkinson of New South Wales is acknowledged at least 116 times (Clarke 1990: 136). A comprehensive analysis of the collector citations in *Flora australiensis* and Mueller's publications has yet to be done, and no doubt it will lead to the identification of additional female collectors.

Eponymy

For Mueller, as is revealed by his pique about being ignored by fellow-botanist August von Krempelhuber, being commemorated in a new species was one of the highest accolades in botany. In 1881, Mueller named one of Mary's Bate's specimens *Myoporum bateae* and wrote to her with little subtlety,

I hope this acknowledgment will encourage you to continue your searches as doubtless a whole host of rare plants and some new ones remain there yet to be discovered. (L81.11.20)

Mueller commemorated 32 (14 per cent) of his female collectors, mostly in a single species. Louisa Atkinson was the exception. He honoured her in five species and

a genus. The rate of commemoration for male collectors is similar, but as they tended to collect more types, they also tended to have more species per individual named for them. Mueller's four top type-collectors were honoured respectively with six species and one genus (John Dallachy), eleven species (Walter Hill), five species (George Maxwell) and eleven species (Augustus Oldfield) (Chapman 1991; Home et al. 1998 Appendix C).

Mary Bate's response to being commemorated in a new species does not survive, but when Mueller named *Dampiera scottiana* for Harriet Scott (later Mrs Morgan), she was effusive, and apparently self-effacing, in her thanks. 'Altho' I feel much gratified at the honour you have done me,' she declared, 'yet I should have been better pleased if the name had been Müelleri [*sic*] or Woollsi,' for I do not deserve the notoriety & you do.' Nevertheless, Scott was anxious to add, 'Will you please remember my name is *Harriet* Scott not *Helena* as you address me – my sister is *Helena* Forde but I am, and always shall be I dare say sincerely yours *Harriet* Scott' (L81.08.15).

Payment

Over the course of his career as Government Botanist, Mueller paid a number of male collectors to go out into the field for fixed periods, but entered into no similar arrangement with women. Amalia Dietrich, the sole professional female natural history collector in his network, worked for Museum Godeffroy in Hamburg, and Mueller obtained a set of her specimens from Christian Luerssen. Mueller was willing, however, to give over small sums of money, in some instances, to male or female collectors, for batches of specimens (*West Australian* 2 July 1889: 3), or to pay for their expenses.

In 1886, Ellie Bauer, who collected for Mueller in far north Queensland, totted up sums of money she had expended in her recent collecting efforts and the total was twelve shillings and four pence. Bauer's costs included postage, wharfage, export entry and shipping, all of which were complicated matters between Cooktown and Melbourne. 'I always have to send my packets by letter post,' she explained, '& put the full amount in stamps on, according to the weight, as the

7. After mutual friend and botanist William Woolls.

post office officials in Cooktown detain them unless I do saying, I cannot send things of commercial (?) value by book post'. Bauer hoped that she had not put Mueller 'to too much expense' (L86.03.09), but he had every reason to be grateful for her ingenuity in dealing with petty officials in getting specimens to him that were of great botanical value, and she remained in his network beyond her marriage in 1888.

Money is occasionally mentioned in Mueller's surviving correspondence with female collectors, but more often his payments to them involved gifts that he regarded as tokens of his appreciation. These were offered to male and female collectors and included botanical books, seeds of garden flowers, vegetables or trees, or a signed photograph of himself, and, of course, his letters themselves, which were valuable because they were from a famous individual (*West Australian* 15 August 1895: 5).

The importance of such gifts to female collectors should not be underestimated. In 1880, Kate Taylor, who lived with her mother in Albany, Western Australia, thanked Mueller for a present of bulbs that she had planted in her garden, and were growing 'beautifully'. 'My dear Mother', Taylor told Mueller, 'is now able to walk into the garden with my help, to see their progress each day, which is a great pleasure to us both' (L80.04.27). Jessie Hussey felt honoured to possess a photograph and a lithographed portrait of Mueller. 'You sent me a splendid photograph of yourself in June 1893', she told him two years later, '(it came on my birthday). I greatly value these, and all other offerings I receive from you' (L95.02.30).

Personal growth

Given that most of Mueller's female collectors spent only one or two years in his network it is difficult to see this experience as significant in the context of the rest of their lives. Nevertheless, to some of his collectors, at least, obtaining specimens for Mueller clearly was significant, and undoubtedly all the more so, because it engaged them with a vast flora enterprise, and led to a scholarly friendship with a famous botanist, both unexpected and untraditional activities for a female in the 19th century.

In his circular on plant collecting, Mueller also hinted at the possibility of personal growth through botany, to which he could testify personally.

Researches of these kinds became furthermore the sources of educational works, and unfold to well-trained and intelligent minds pure recreative and healthful pleasures, inexpressively everywhere within reach. (Mueller 1876)

It was a message that came to be appreciated by Jessie Hussey, a troubled young woman living at Port Elliot on the eastern end of the Fleurieu Peninsula in South Australia. When she was 27, Hussey lost her hearing after a short illness, and according to an obituary, this affliction left her feeling hopeless about the future. In 1893, Hussey's father persuaded her to collect algae for Mueller to give her a useful occupation. The partnership lasted for the rest of Mueller's life, and their surviving letters reveal how much a shared interest in botany meant to both of them.

In 1894, Mueller told Hussey that he felt 'much touched' by a recent letter in which she spoke of 'the new sources of pleasure, which had arisen to you, since you obtained some scientific insight into the native flora there'. 'Such assurances', Mueller declared, 'I prize among the best I ever earned' (L94.00.00). In 1896, Mueller wrote,

I can assure you that I feel always elevated by the reflection that I can influence many in the younger generation far higher contemplations, and I am cheered when I think that they will bear me same friendly remembrance long after I have passed away. (Mueller 1896)

He died four months later.

Conclusion

Over the course of his 43-year career as Government Botanist of Victoria, Ferdinand Mueller recruited at least 225 girls and women into his network of plant collectors. This represented about 12 per cent of his entire network, a figure proportionately much higher than the 4 per cent of women in the network of the Kew Herbarium, the foremost such institution in the British Empire. While there is no evidence that Mueller privileged women in his search for collectors, he did exploit Western society's acceptance of female interest in botany to make his network of collectors as large as possible. In pushing the boundaries of what was deemed possible for girls and

women, he achieved some significant firsts among his female collectors for his collecting network as a whole, including the use of children and named Aboriginal collectors.

Mueller could not, however, and undoubtedly did not seek to, set aside, all gender-discriminatory practices of 19th-century society for the sake of his work. Their influence on female participation in his network can be seen in a number of ways. Women seem to have been mostly recruited to the network through relational ties, and the geographical range of their collecting was limited, which meant that compared to male collectors they contributed relatively few new species. The botanical contributions of girls and women were also influenced by having an 'ornamental' education, which was expressed in botanically-themed creative arts, and a fashionable interest in plant sub-groups such as ferns and algae. Most significantly, however, the time that the overwhelming majority of Mueller's female collectors spent in his network was confined to one or two years, after which they seem to have returned completely to their more traditional work as wives or mothers. While Mueller did not hire women as botanical collectors or artists, he otherwise repaid and acknowledged their contributions to his taxonomic work in the same way as his male collectors.

The compilation of Maroske and Vaughan's (2014) biographical register of Mueller's female collectors made it possible to access this group of 19th-century girls' and women's botanical activities, which hitherto were largely unknown. In addition, small numbers of surviving letters and other fragmentary manuscript and documentary evidence bring some personal details about their motivations and satisfactions into focus. The story of Mueller's female collectors emphasises the collaborative nature of flora writing, something that is downplayed when *Flora australiensis* is attributed to a single author, George Bentham ('with the assistance of Ferdinand Mueller'), despite internal references to collectors. Both male and female collectors are disenfranchised by this process, but in an era when women rarely participated in floras beyond the realm of collecting (even in the final years of the century), any historical approach that focusses on the achievements of 'great scientists' tends to lose sight of the female gender altogether.

A botanical history that recovers the contributions of girls and women in this context will require reframing to incorporate contributions that individually are minor, but collectively important. It will also require expanding the achievements of the 'great men of science' like Mueller, who should be credited with helping to create and to shape an appetite for botany in Australia. Perhaps most importantly of all, it will need to be able to see botany from the point of view of female collectors, and this will require considering aspects of their lived experience previously excluded as irrelevant because they were deemed merely ornamental or domestic.

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